COVID-19 SCHOOL BUILDING HVAC CHECKLIST (DRAFT)

2015 Michigan Mechanical Codes, ASHRAE Standards 55 & 62.1, and ASHRAE COVID-19 Guidelines

Customer Name: _____ Date:_____

Building Name: _____

This checklist is intended for use by a licensed mechanical contractor to review the HVAC systems in K-12 schools in the State of Michigan. Once completed, the list will provide a record of the current status towards having the listed items in place and functioning correctly to school officials along with estimated cost for any items on the checklist that do not meet the ASHRAE recommendations. For each item that requires attention, the contractor is to provide a brief description of what needs to be done to bring the item up to recommended levels along with the estimated budget cost, recorded in space provided at the end of this document.

Review each of the following line items and check Yes, No, or N/A (not applicable) for each item to reflect actual onsite conditions for the subject building.

HVAC INVENTORY

Air Handling Units
- ☐ Roof Top Units Qty_____
- ☐ Air-side Economizers Qty_____
- ☐ Packaged Terminal Units _____
- ☐ Unit Ventilators Qty_____
- ☐ Fan-Coils Qty_____
- ☐ Furnace Qty_____
- ☐ Window Air Conditioner Qty_____

Boilers
- ☐ Hydronic Qty_____
- ☐ Steam Qty_____

Pumps
- ☐ Pumps QTY_____

Fans (freestanding)
- ☐ Fans QTY_____

Chillers
- ☐ Air Cooled Qty_____
- ☐ Water Cooled Qty_____

Cooling Tower QTY_____

Building Automation System
Brand_____
Model_____
Software Version_____

GENERAL OBSERVATIONS

Yes No N/A ☐ Check this box if additional information is attached.

1) ☐ ☐ ☐ Reviewed status of building complaints and addressed deficiencies identified if possible?
2) ☐ ☐ ☐ Reviewed existing system design for compliance with this guidance?
3) ☐ ☐ ☐ Completed general inspection of spaces to identify if any water leaks or mold growth visible?
4) ☐ ☐ ☐ Verified separation between outdoor air intakes and exhaust discharge outlets (min 10')?
5) ☐ ☐ ☐ Verified bird screens in place and unobstructed?
6) ☐ ☐ ☐ Reviewed if any nearby contaminant sources negatively impacting outside air?

MECHANICAL ROOM

Yes No N/A ☐ Check this box if additional information is attached.

7) ☐ ☐ ☐ Room is clean and dry?
8) ☐ ☐ ☐ Chemicals are not stored in the room?
9) ☐ ☐ ☐ Mechanical systems do not show any evidence of improper operation?
10) ☐ ☐ ☐ Control systems do not show evidence of improper operation?
11) ☐ ☐ ☐ Pumps and associated electrical components do not show evidence of improper operation?

BUILDING CONTROL SETTINGS FOR ASHRAE STANDARD 55

Yes No N/A ☐ Check this box if additional information is attached.

12) ☐ ☐ ☐ Building has building automation system (BAS)? Brand_____Model_____
13) ☐ ☐ ☐ BAS software is up to date? Version number _____
14) ☐ ☐ ☐ Winter indoor air temp set at 72°F and 40-50% RH humidity?
15) ☐ ☐ ☐ Summer indoor air temp set at 75°F and 50-60% RH humidity?
16) ☐ ☐ ☐ Control sequences maintain required ventilation, temperature, and humidity conditions to occupied areas?
17) ☐ ☐ ☐ Ventilation system operate 2 hours before and after occupancy?

18) ☐ ☐ ☐ DOAS systems operate 2 hours before and after occupancy?
19) ☐ ☐ ☐ Exhaust fans turn on when DOAS is running during occupancy?
20) ☐ ☐ ☐ Control sequences in VAV systems avoid outdoor air flow/minimum OA air flow shortage?
21) ☐ ☐ ☐ Economizer operations maximized when possible to use favorable outside air?
22) ☐ ☐ ☐ Unusual observations documented that are not recorded by the control system?

AIR HANDLING UNITS

Yes No N/A ☐ Check this box if additional information is attached.

23) ☐ ☐ ☐ Any evidence of improper operation on the control system and devices?
24) ☐ ☐ ☐ Any drive belts need to be repaired or properly tensioned?
25) ☐ ☐ ☐ Drain pans clean and have the proper slope?
26) ☐ ☐ ☐ Evidence of biological growth on the coils?
27) ☐ ☐ ☐ Air filters installed correctly and filter rack is in good condition?
28) ☐ ☐ ☐ Air filters sealed to rack and spacers, if present?
29) ☐ ☐ ☐ Air filters in good condition? Date installed_____ MERV rating of filter _____
30) ☐ ☐ ☐ System can accommodate higher-rated filter than current? Suggestion _____
31) ☐ ☐ ☐ System has pressure gage to assist in determining filter change frequency?
32) ☐ ☐ ☐ Unit has humidifier, and it is in good working order? (if not recommend a unit)
33) ☐ ☐ ☐ Unit has ultraviolet lamps, and they are in good working order?
34) ☐ ☐ ☐ Unit has bipolar ionization, and it is in good working order?
35) ☐ ☐ ☐ System does not have disinfection feature but can accommodate one, such as UV-C or bipolar ionization? Suggestion_____
36) ☐ ☐ ☐ Control dampers are operating properly?
37) ☐ ☐ ☐ AHU is bringing in outdoor air and removing exhaust air as intended?
38) ☐ ☐ ☐ Unit has Energy Recovery System?
39) ☐ ☐ ☐ Energy Recovery System allows exhaust airstream to transfer to the supply airstream?
40) ☐ ☐ ☐ Without adversely impacting system operation, outside air can be set to maximum amount?
41) ☐ ☐ ☐ Demand Control Ventilation disabled for full outside air?
42) ☐ ☐ ☐ Economizer dampers cleared and functioning?
43) ☐ ☐ ☐ Airflow rates meet the ASHRAE Standard 62.1 or current state code requirements?
44) ☐ ☐ ☐ Unit discharge air temperatures are adequate to maintain desired indoor conditions?

LOCAL HVAC UNITS (Mini Splits, VRF, Unit Ventilators…)

Yes No N/A ☐ Check this box if additional information is attached.

45) ☐ ☐ ☐ Air filters installed correctly?
46) ☐ ☐ ☐ Air filters in good condition? Date installed_____ Type of filter _____
47) ☐ ☐ ☐ System can accommodate higher-rated filter than current? Suggestion _____
48) ☐ ☐ ☐ Unit allows for proper amounts of outside air and operation?
49) ☐ ☐ ☐ Unit air recirculation minimized in zones to reduce cross contamination where using common ductwork?
50) ☐ ☐ ☐ Space has humidifier? (If not recommend a unit)

SPACE CONDITIONS

Yes No N/A ☐ Check this box if additional information is attached.

51) ☐ ☐ ☐ Airflow patterns in spaces are adjusted to minimize occupant exposure to particles from others?
52) ☐ ☐ ☐ Space is using ceiling fans, personal fans, or space heaters with internal fans? (should not be used)
53) ☐ ☐ ☐ Ducts are dry and clean?
54) ☐ ☐ ☐ Adverse air distribution conditions observed? (covered diffusers, blocked return grills, short cycling…)

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NEXT STEP RECOMMENDATIONS

Yes No N/A ☐ Check this box if additional information is attached.

55) ☐ ☐ ☐ Should building be fully retro commissioned by a commissioning specialist?

56) ☐ ☐ ☐ Should local engineer be consulted to review/update design of the system?

57) ☐ ☐ ☐ Should Testing, Adjusting and Balancing (TAB) contractor measure/balance the building?

58) ☐ ☐ ☐ Are all changed operating protocols from this checklist documented?

59) ☐ ☐ ☐ Has management personnel been notified of any changes so the facility operators can be trained?

For additional guidance, see the ASHRAE and the ASHRAE Detroit website and references for this document:

- ASHRAE Reopening Schools and Universities C19 Guidance – has a section for nurse's office and filtration upgrades
- ASHRAE Practical Guidance for Epidemic Operation of Energy Recovery Ventilation Systems
- ASHRAE Position Document on Airborne Infectious Aerosols
- ASHRAE Standard 180: Standard Practice for Inspection and Maintenance of Commercial Building HVAC Systems
- ASHRAE Standard 62.1: Ventilation for Acceptable Indoor Air Quality
- ASHRAE Standard 55: Thermal Environmental Conditions for Human Occupancy
- ASHRAE Guideline 29: Guideline for the Risk Management of Public Health and Safety in Buildings
- "Developing a Water Management Program to Reduce Legionella Growth & Spread in Buildings" by the U.S. CDC
- For assistance, consult your local engineer specializing in HVAC and/or water systems, water treatment specialist, and/or representative.

Any information provided as part of this document is for general information purposes only and should not be construed as medical advice or opinion. Please consult a licensed healthcare professional for medical advice. This document does not guarantee or verify that operating in accordance with these recommendations will be free from risk.

Because of the constantly changing nature of the information associated with the COVID-19 virus, and the differing information obtained from different sources, EGLE excludes all liability and all disclaims all warranties, express or implied as to the accuracy and completeness of this document.

Checklist Completed by (company name): _____

Mich. LARA License #_____ Employee's Name: _____

Signature: _____Date: _____

Building Representative Name (print): _____

Signature: _____ Date: _____

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RECOMMENDED ACTION ITEMS & ESTIMATED COST

Line Item #	Level Import	Description	Estimated Cost Range

Level of importance: **Low** = Nice to have / **Med** = Long term goal / **High** = Needed to meet standard

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PLEASE NOTE THAT THIS SECTION IS UNDER DEVELOPMENT FOR USE AS A COVER PAGE FOR THE SCHOOL OFFICIALS. IT WILL BE USED TO FURTHER EXPLAIN SOME OF THE ASHRAE RECOMMENDED STRATEGIES FOR COVID-19.

INTRODUCTION

Covid-19 has been identified by the CDC as an airborne virus. For that reason, ASHRAE (American Society of Heating, Refrigerating, and Air-Conditioning Engineers) has created an epidemic task force to develop guidance on the operation of HVAC (Heating, Ventilating, Air-Conditioning) to help try to mitigate the spread of the virus. To review all the recommendations please go to the **ASHRAE Epidemic Task Force Schools & Universities** 41-page document that is updated as needed. The list of items on this checklist are all comprised from the ASHRAE recommendations and from the EGLE (Environment, Great Lakes, and Energy) air quality checklist. This is intended to provide guidance on how existing systems may be adjusted and operated during the pandemic as well as providing an assessment of additional items and strategies that may be adopted in the future to improve HVAC systems in K-12 schools in the State of Michigan.

GENERAL OBSERVATIONS

When the HVAC specialist arrives on site, they should take note of the listed items to identify any outside issues that negatively impact the building's operation. By surveying the building and interviewing the building occupants, current conditions can be confirming that may give an indication of areas to focus on. (Example: Identifying the area that outside air enters the building is unobstructed).

MECHANICAL ROOM

An HVAC specialist can gather a lot of information about the main HVAC systems by studying a mechanical room. The list of questions are related to general observations to identify potential issues.

BUILDING CONTROL SETTINGS FOR ASHRAE STANDARD 55

ASHRAE provides standards for how to operate building systems for occupants' comfort. The checklist items identify that the systems are set to optimum standards. The Pandemic Task Force has added further recommendations for airborne viruses. (Example: Running the air handling systems for 2 hours before and after occupancy will "Flush" the air within the spaces with outside air to reduce concentration of any potential contaminants.)

AIR HANDLING UNITS

This section will have the most information that will be rounded out to explain the reasons and highest importance of the items.

LOCAL HVAC UNITS (Mini Splits, VRF,Unit Ventilatiors…)

This is the same idea as the air handling but for units that are located within the occupied spaces.

SPACE CONDITIONS

More observations and issues here based on the actual occupied spaces that may impact HVAC or IAQ.

NEXT STEP RECOMMENDATIONS

This section is for the service provider to identify if any deficiencies need further specialists to identify and fix issues.